



# National Transportation Safety Board

## NBAA Safety Committee Risk Assessment Meeting

Robert Sumwalt



Making Transportation Safer  
YESTERDAY ★ TODAY ★ TOMORROW

# Welcome to NTSB Training Center



# The Board



Bella Dinh-Zarr



Chris Hart



Robert Sumwalt



Earl Weener





# Lockhart, TX

July 2016



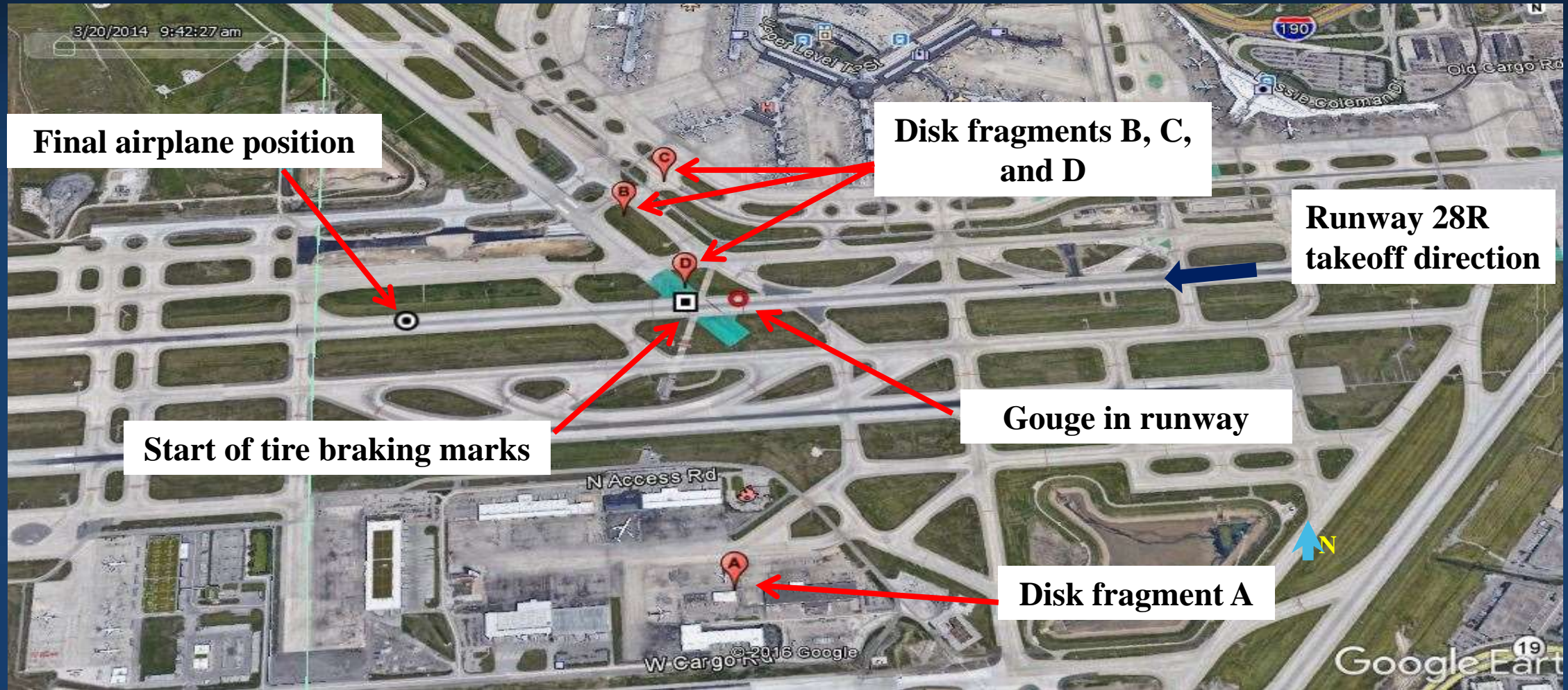








# Disk Fragment Locations



# Video of Rejected Takeoff and Evacuation

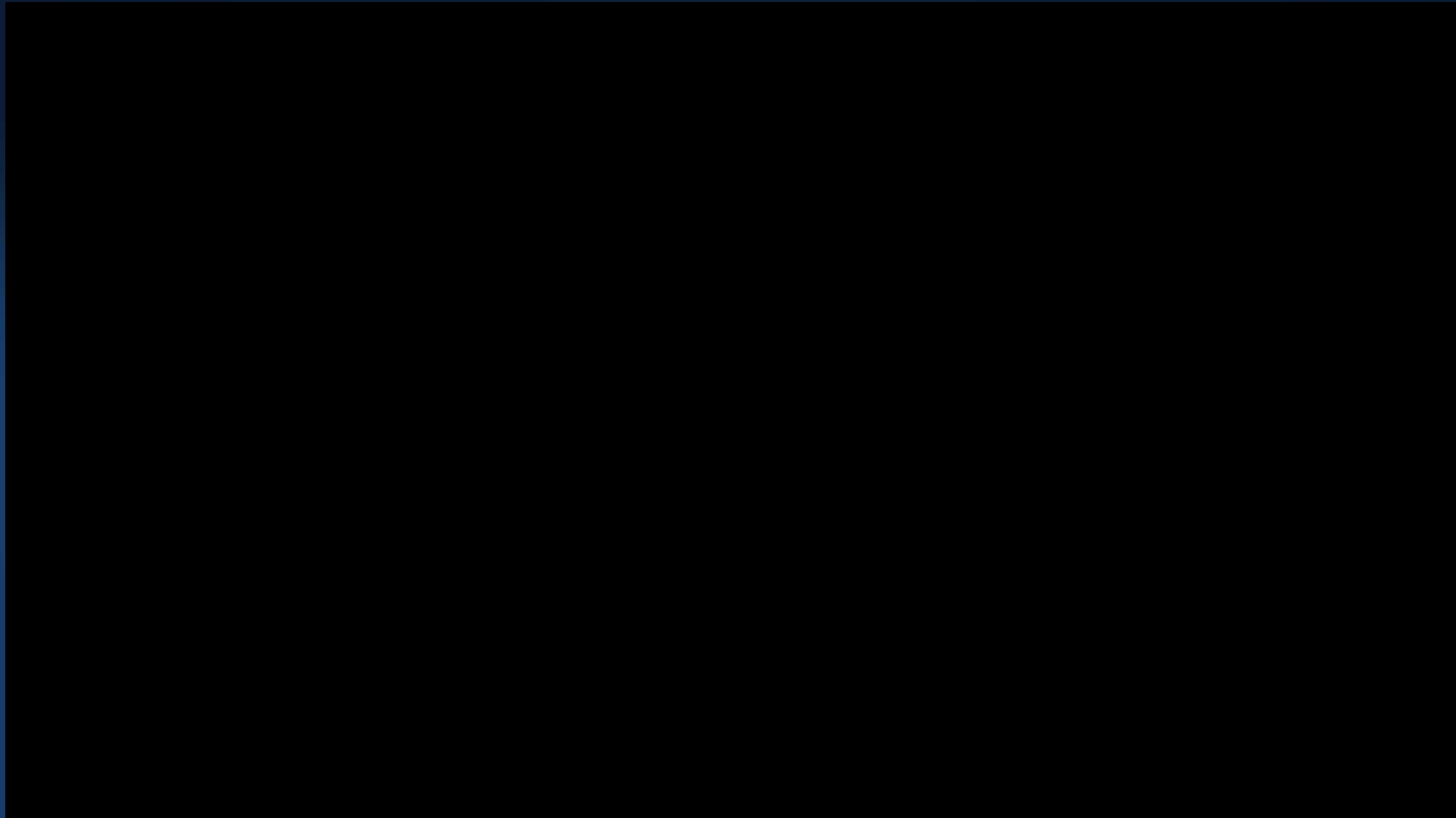


Rejected takeoff



Evacuation





# Unusable Attitude of 4L Slide





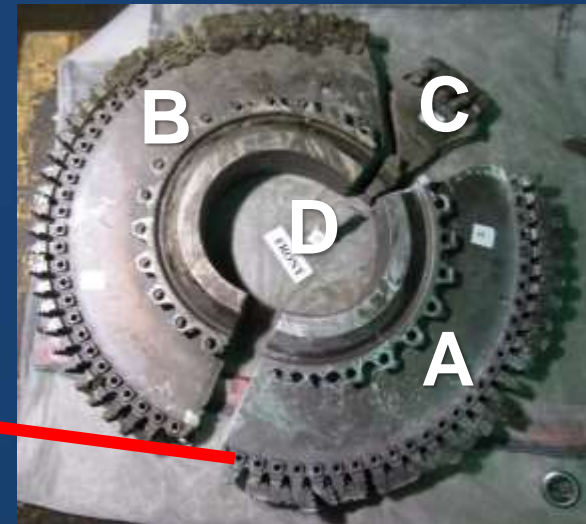


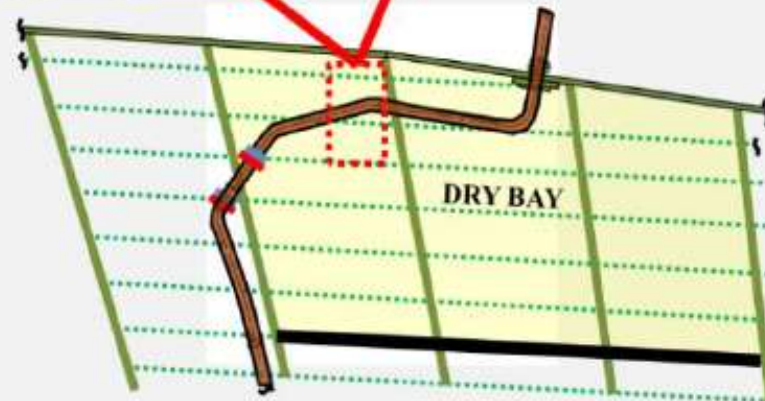
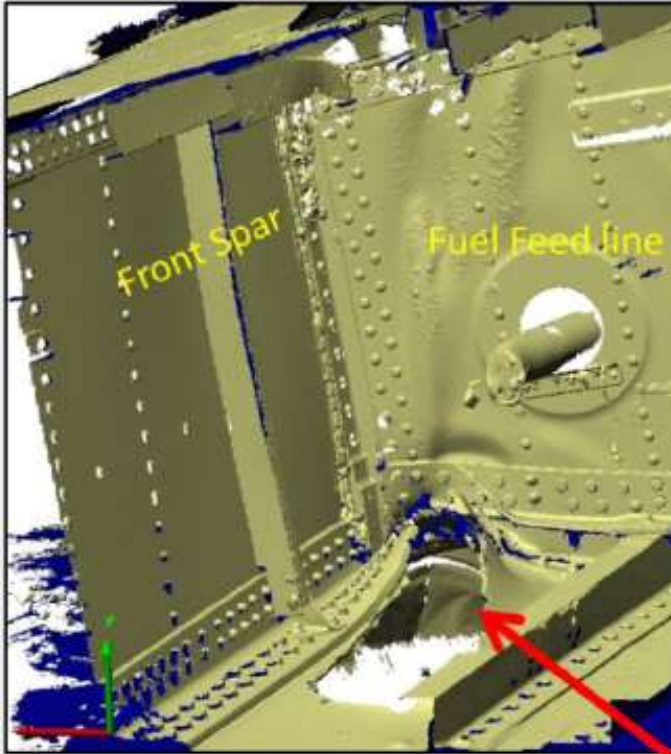




# Uncontained Engine Failure

- High-pressure turbine (HPT) stage 2 disk rupture
- HPT stage 2 disk nickel-based alloy













# Runway Safety





# NTSB reports on pilots falling asleep

Feds want to rewrite rules to curb fatigue

By Alan Levin  
USA TODAY

WASHINGTON — Two airline pilots fell asleep while cruising over Hawaii last February, flying past their destination for 18 minutes before waking up and returning for a safe landing, federal accident investigators revealed Tuesday.

That incident and an accident in Traverse City, Mich., last year highlighted the need to stem the growing list of crashes attributed to the lengthy hours that pilots routinely work, the National Transportation Safety Board (NTSB) said. Crashes linked to fatigue have killed 249 people since 1997, according to NTSB records.



By Marco Garcia, AP

**Fatigue to blame:** Two Go Airlines pilots working a "demanding" schedule fell asleep and flew past their destination February.

"It's an insidious issue," NTSB Chairman Mark Rosenker said. "Many times the pilots themselves don't recognize that they are fatigued when they get into that cockpit."

The NTSB voted to recommend that federal aviation regulators and airlines use fatigue studies to rewrite the rules for how long pilots can legally fly.

Currently, federal law allows pilots to work up to 16 hours a day, including up to eight hours behind the controls, and loopholes allow longer days in some situations.

Air-traffic controllers frantically radioed Go Airlines Flight 1002 from Honolulu to Hilo, Hawaii, for 18 minutes on Feb. 13, but got no response from the pilots, said NTSB investigator Jana Price.

The two pilots had been flying together for three arduous days "that involved early start times" and a "demanding" sequence of short flights, the captain had been diagnosed with severe obstructive sleep apnea, she said. Apnea causes people to repeatedly wake up during the night and has been linked to poor work performance and accidents.

In a separate investigation, the NTSB concluded that a regional airline crash last year in Traverse City was probably triggered by fatigue. Pinnacle Airlines Flight 4712 skidded off the end of a snowy runway on April 12, 2007, after landing in the early hours of the morning. None of the 49 passengers, two pilots and a flight attendant were injured.

The NTSB found that the pilots of the Bombardier CRJ-200 jet should never have attempted the landing.

The runway was too slick to land under the airline's rules, but the pilots failed to perform a basic landing calculation and missed other warning signs that the weather was deteriorating.

The accident happened after the pilots had worked 14 hours. The cockpit recorder overheard the pilots yawning and the captain made repeated references to being tired, the NTSB found.

The NTSB has been calling for reform of pilot work rules for decades. Several attempts to rewrite pilot work rules have failed in the face of opposition from airlines and pilot groups.

Contributing: Dennis Camire of Gannett News Service



## A lag for fatigue-related safety rules

Efforts to ensure pilots, fatigue not enough rest

The crash of Continental Connection Flight 3407 outside Buffalo in February 2009 heightened concerns about pilot fatigue. Four

### This project

This article is one of several from a project detailing troubles with the

Seven years after that recommendation, a cruise ship ran aground off the Alaskan coast after its pilot erred while trying to guide the ship over a well-known

## Car Shootout

Car tested and rated by... Results, 1-2, 4B

## Many pilots exposed to fatigue

Thousands of flights are at riskier hours

By Alan Levin and Barbara Hansen  
USA TODAY

Airlines operate thousands of flights each day that expose pilots to potentially dangerous fatigue, schedule data and the latest NTSB shows.



NTSB 2017-2018  
**MOST WANTED LIST** OF  
TRANSPORTATION  
SAFETY  
IMPROVEMENTS

Reduce Fatigue-Related  
Accidents



### What is the issue?

Fatigue impairs performance and degrades a person's ability to stay alert, attentive, and engaged in the task of controlling a vehicle safely.

Airplanes are machines that require complex human interaction and an operator's complete attention and skill. All too often, however, amateur and professional pilots, air traffic controllers, and maintenance personnel performing safety-critical functions are impaired by fatigue stemming from insufficient or poor-quality sleep. To manage the risks of operator fatigue in public transportation systems, companies must ensure that employees get enough rest, as well as make personal choices to attend to medical and quality-of-life problems that negatively impact their fitness for duty and sleep quality.

Over the years, we have investigated many accidents in all transportation modes in which fatigue was a probable cause or a contributing factor. Nearly 20 percent of the 182 major National Transportation Safety Board investigations completed between January 1, 2001, and December 31, 2012, identified fatigue as a contributing factor, or a finding.

The consequences of fatigue on human performance can be subtle. Operators may not recognize how slowed reaction times, and poor judgment until it is too late. The traveling public can unknowingly be placed at risk because a fatigued operator cannot safely execute his or her duty.

Human fatigue can be acute or chronic; both often arise from poor sleep and health management. Fatigue impairs performance and degrades a person's ability to stay alert, attentive, and engaged in the task of controlling a vehicle safely.

### What can be done?

We must acknowledge that fatigue is a manageable threat to transportation safety that can be mitigated through reasonable measures based on individual responsibility. We must draw attention to the medical and individual sleep quality, such as obstructive sleep apnea (OSA), and legs syndrome. We must also draw attention to company policies that require operators to schedule adequate off-duty time for rest and to address health conditions that affect the quality of their sleep.







# NTSB 2017–2018 **MOST WANTED LIST** OF

## TRANSPORTATION SAFETY IMPROVEMENTS

# End Alcohol and Other Drug Impairment in Transportation



**AVIATION**







NTSB 2017-2018  
**MOST  
WANTED  
LIST** OF  
TRANSPORTATION  
SAFETY  
IMPROVEMENTS

**Expand Recorder Use to  
Enhance Safety**



**AVIATION**



# Gaithersburg, Maryland

December 2014



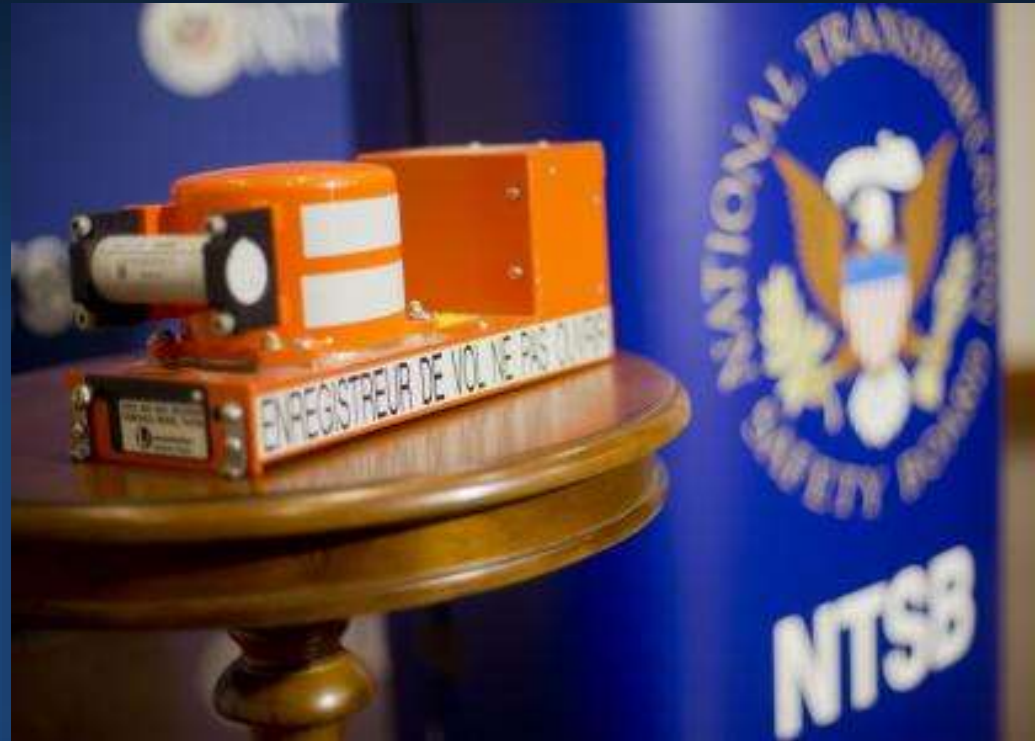








“Embraer’s decision to install a cockpit voice and data recorder in the EMB-500 fleet greatly benefited the NTSB’s investigation ... by ensuring investigators had access to critical information for determining the sequence of events that led to the accident and identifying actions needed to prevent a similar accident in the future.”







# NTSB 2017–2018 **MOST WANTED LIST** OF TRANSPORTATION SAFETY IMPROVEMENTS

## Prevent Loss of Control in Flight in General Aviation



**AVIATION**





# Act to End Deadly Distractions

**2<sup>ND</sup> ROUNDTABLE ON DISTRACTIONS**

PRESENTED BY THE  
**National Transportation Safety Board**  
AND **StopDistractions.org**



**WEDNESDAY, APRIL 26, 2017**  
9:00AM-4:30PM | WASHINGTON, DC  
NTSB BOARDROOM & CONFERENCE CENTER

FACILITATED BY NTSB BOARD MEMBER  
**The Honorable Robert Sumwalt**

AND **StopDistractions.org**  
**National Transportation Safety Board**  
PRESENTED BY THE

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